

NASA TECH BRIEF

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Thermal Analysis System (TAS-1) Program

The problem:

To devise a computer program for the development of a temperature control system which would maintain various subsystems within the proper temperature limits.

The solution:

An easy-to-use digital computer program for thermal design analysis, which fills the gap between simple hand calculations and other computer programs that require complex user input. The program may be used whenever the problem or the time available does not justify or permit a more complex computer program. Or, it may serve as a stepping stone to complex thermal analyses. Because the program is intended mainly as a design tool for the temperature control engineer, coding is simple and the input rules are easy to use and remember. The output format is easy to understand and to analyze for error diagnosis.

How it's done:

The Thermal Analysis System program (TAS-1) combines a thermal analysis program with subprograms which compute the infrared conductance and the heat input due to solar heating.

The spectral analysis formulation is developed for two regions: a solar region in which solar properties apply, and an infrared (IR) region in which the IR properties apply. This separation is possible because there are two widely different temperature levels being considered: the high solar temperature, and the much lower spacecraft temperature. The solar region energy due to IR radiation is negligible in comparison with the solar energy itself. This widely

used assumption makes it possible to compute the heat inputs in the solar region separately from the IR heat transfer. Thus, the heat inputs in the solar region are not a function of the spacecraft temperature. The problem solution is therefore reduced to that of finding the spacecraft temperature distribution for a single wavelength region, without the iteration procedures that would be necessary for multiple regions.

Notes:

1. This program is written in FORTRAN IV and is operational on the IBM-7094, IBM-360/65, UNIVAC-1108 (EXEC 2), UNIVAC-1108 (EXEC 8), and CDC-6400. The COSMIC version has executive control cards for operation on an IBM-7094, and these must be changed for use on the other machines.
2. Requests for further information may be directed to:

COSMIC
112 Barrow Hall
University of Georgia
Athens, Georgia 30601
Reference: B71-10386

Patent status:

No patent action is contemplated by NASA.

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